

# NASA SBIR/STTR Technologies

## A2.01-8521 - An Uninhabited Aerial System Safety Analysis Model (USAM)



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### Identification and Significance of Innovation

Historical UAS operational data upon which the safety of civil UAS operations in the NAS can be forecast is almost non-existent. In order for FAA to safely and efficiently integrate UAS in the NAS, it is imperative to perform the Operational Safety Assessment (OSA) to determine whether the UAS introduction will enhance or detract the safety of NAS.

The product of this effort is the development of a data-driven, integrated safety analysis model called Uninhabited Aerial System Safety Analysis Model (USAM). USAM is an extension of current efforts underway by the UAS community, extending these efforts by incorporating UAS scenarios and encounter geometries to populate existing safety analysis models, thereby producing credible future UAS safety metrics

Estimated TRL at beginning and end of contract: ( Begin: 2 End: 3 )

### Technical Objectives and Work Plan

The primary technical objectives are to:

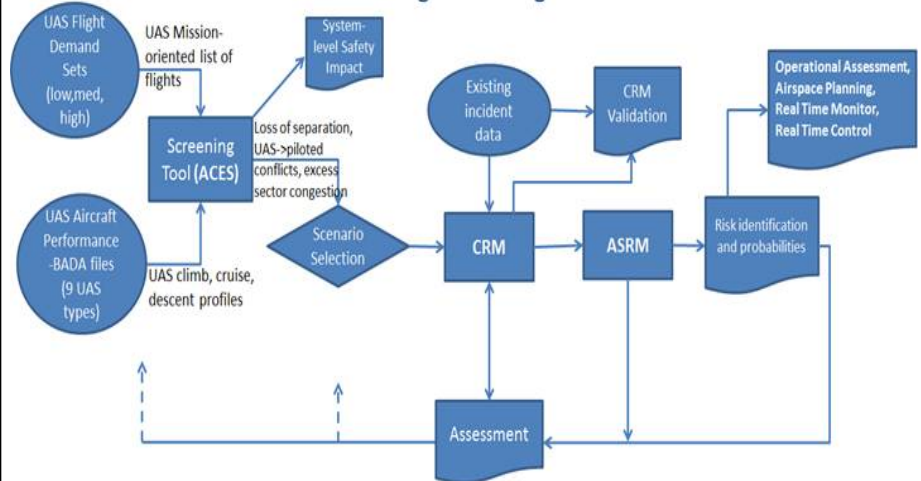
- 1) quantify the system level impact of introducing UAS on safety and congestion of the NAS;
- 2) identify potentially hazardous scenarios where loss of separation might occur;
- 3) compute collision probability for each of the identified scenario; and
- 4) establish the causal links by performing a full hazard assessment.

Work Plan:

In order to meet these technical objectives, the following proposed tasks comprise Phase II of the project.?

- 1) Execute NAS-wide simulation to quantify system level effect of UAS integration.
- 2) Select 15 conflict scenarios spanning across all UAS and airspace classes.
- 3) Perform verification and validation of CRM using real accident/incident data.
- 4) Compute conditional probability of collision using (enhanced) CRM.
- 5) Perform full hazard assessment using (enhanced) ASRM.

USAM Integration Diagram



### NASA Applications

A valuable analysis tool that NASA researchers can use to assess the safety component of their proposed future NAS configurations, including future NextGen improvements. With the existence of USAM, safety analysis including UAS vehicles will become a possible, and ultimately required, part of all future NextGen analyses.

### Non-NASA Applications

FAA will use USAM to perform full hazard assessment and quantification of safety issues surrounding UAS introduction into the NAS. UAS manufacturers can use it as a virtual simulation tool to fly their UAS with other traffic, to quantify collision risk probability and identify the top hazards. If the probability is low, they can continue production, or re-engineer the UAS to remove risky hazards.

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NON-PROPRIETARY DATA